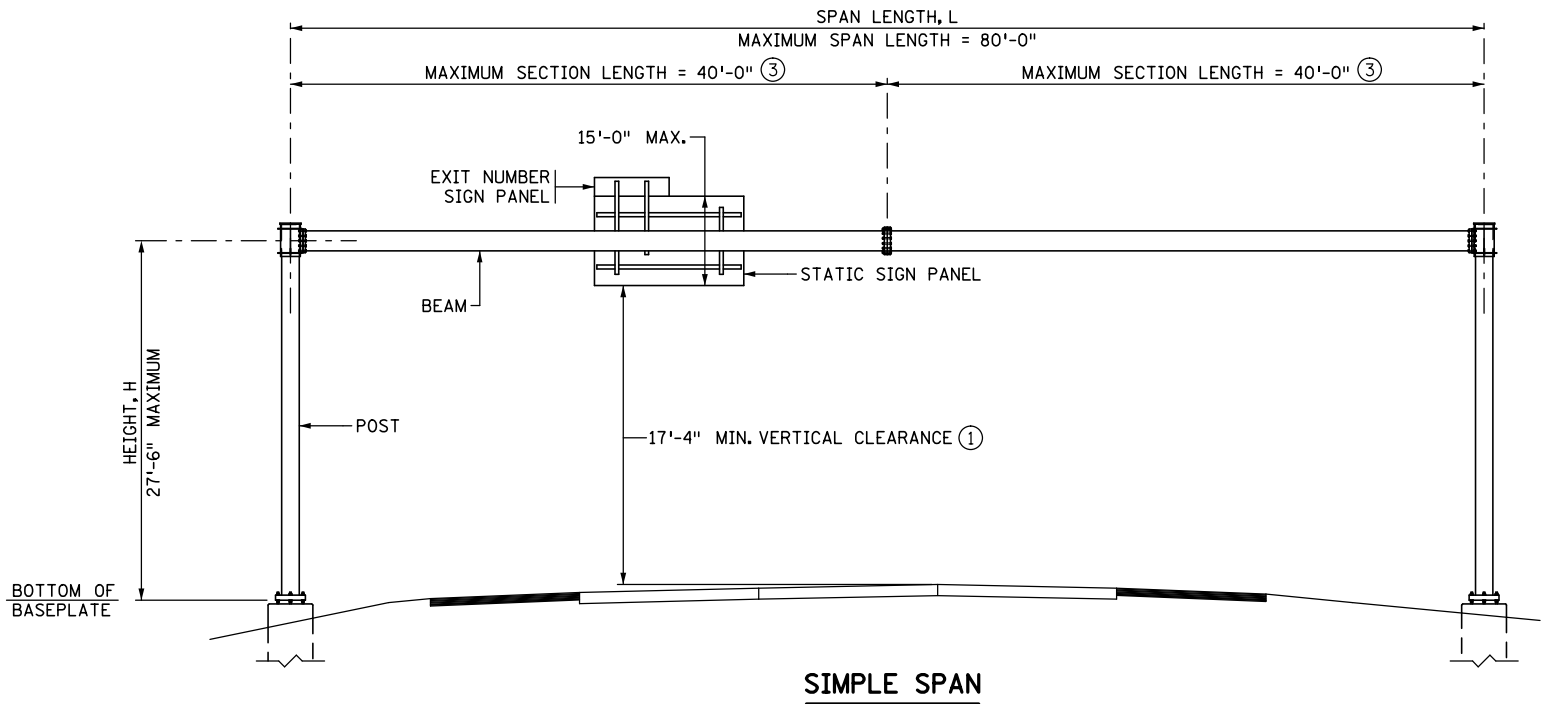


DISTRICT #: \$@DISTRICT\$\$\$  
PLOT NAME: \$\$\$PLOT\$NAME\$\$\$  
PATH & FILENAME: \$\$\$@PATH\$FILENAME\$\$\$

PLOTTED/REVISED: 6/22/2020



STRUCTURE QUANTITIES			
-LENGTH (L) OF SIMPLE SPAN SUPPORT STRUCTURE IS FROM C POST TO C POST. -LENGTH (L) OF CANTILEVER STRUCTURE IS FROM C POST TO END OF PROJECTING ELEMENT. -HEIGHT (H) OF SUPPORT STRUCTURE IS FROM BOTTOM OF BASEPLATE TO C BEAM. -STRUCTURAL STEEL QUANTITIES INCLUDE THE FOLLOWING : SIMPLE SPAN: BASEPLATES, POSTS, SLEEVES, BEAM, AND BEAM SPLICE PLATES. CANTILEVER: BASEPLATE, POST, POST/BEAM CONNECTION, BEAM, AND END CAPS.			
STRUCTURAL STEEL	SIMPLE SPAN	BEAM WITH CONNECTIONS	676 LBS + 83(L) LBS/FT
		POSTS WITH CONNECTIONS	2210 LBS + 145(H) LBS/FT (5)
	CANTILEVER	BEAM WITH CONNECTIONS	366 LBS + 105(L) LBS/FT
		POST WITH CONNECTIONS	1678 LBS + 79(H) LBS/FT

SIMPLE SPAN	
SPAN LENGTH	MAX. SIGN AREA (4) SQFT
55'-0"	225
70'-0"	210
80'-0"	200

CANTILEVER	
SPAN LENGTH	MAX. SIGN AREA (4) SQFT
20'-0"	205
25'-0"	200
30'-0"	170
35'-0"	140
40'-0"	115
44'-0"	100

GENERAL NOTES:

DESIGN CRITERIA:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS", FIRST EDITION, 2015, 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH  
SERVICE LIMIT WIND LOADING OF 76 MPH

MATERIAL PROPERTIES:

PROVIDE STRUCTURAL CONCRETE (3G52) PER SPEC. 2461 FOR DRILLED SHAFTS.

PROVIDE DEFORMED BILLET BARS IN ACCORDANCE WITH AASHTO M 31, GRADE 60 (SPEC. 2472 AND SPEC. 3301) FOR FOUNDATION REINFORCEMENT. PROVIDE EPOXY COATED BARS WHERE IDENTIFIED.

ALL REINFORCEMENT IS IN ENGLISH DESIGNATIONS.

STRUCTURAL STEEL (EXCEPT POST) - SPEC. 3306  
STRUCTURAL STEEL PIPE ----- SPEC. 3362, ASTM A 500 GRADE B (F<sub>y</sub> = 42 KSI)  
OR GREATER API 5L, GRADES B, X42, X46,  
X52, X56, X60, X65

HIGH STRENGTH BOLTS----- SPEC. 3391.2B  
ANCHOR RODS----- SPEC. 3385 TYPE B  
CASTINGS----- SPEC. 3322  
REINFORCEMENT  
BARS----- SPEC. 3301  
SPIRAL----- SPEC. 3305

DEMONSTRATE THAT THE POST MATERIAL MEETS THE REQUIREMENTS OF ONE OF THE ABOVE CITED SPECIFICATIONS AND THE MINIMUM YIELD STRENGTH.

FINISH:

WITH THE EXCEPTION OF REINFORCEMENT BARS, THE LOWER PORTIONS OF ANCHOR RODS, AND ALUMINUM AND OTHER NON FERROUS INCIDENTALS, GALVANIZE COMPONENTS AFTER FABRICATION IN ACCORDANCE WITH SPEC. 3392 OR SPEC. 3394 AS APPLICABLE. BEARING SURFACES MUST BE SMOOTH.

FABRICATION:

FABRICATE STRUCTURAL METALS IN ACCORDANCE WITH SPEC. 2471, SPEC. 2564 AND THE APPLICABLE SPECIAL PROVISIONS. ALL WELDING TO BE CONTINUOUS. ALL CONTACT SURFACES MUST BE COMPLETELY SEALED.


INSPECTION:

PROVIDE INSPECTION BEFORE AND AFTER GALVANIZING IN ACCORDANCE WITH SPEC. 1511 AND 2471.

SPECIFIC NOTES:

- MEASURE MINIMUM CLEARANCE FROM THE HIGHEST ELEVATION OF THE TRAVELED WAY OR SHOULDER, OR IF BARRIER CURBS ARE USED, THE HIGHEST ELEVATION BETWEEN CURB LINES TO THE LOW SIGN EDGE.
- MEASURE MINIMUM CLEARANCE FROM THE LOW SIGN EDGE OF THE TALLEST PANEL TO THE HIGHPOINT ELEVATION OF TRAVELED WAY OR SHOULDER BENEATH THE STRUCTURE.
- NO MORE THAN 2 SECTIONS ARE ALLOWED. THE SECTIONS ARE NOT REQUIRED TO BE EQUAL LENGTHS.
- INCLUDES EXIT PANEL.
- PROVIDES STEEL WEIGHT FOR TWO POSTS AND CONNECTIONS.

REVISION:
APPROVED: XXXXX XX, 2020
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 <b>MINNESOTA</b>  DEPARTMENT OF TRANSPORTATION	STANDARD PLAN 5-297.745		1 OF 1		<b>MONOTUBE OVERHEAD SIGN STRUCTURES</b> GENERAL ELEVATIONS, SECTIONS AND NOTES						
	APPROVED: 12-31-2099 REVISED:										
	STATE DESIGN ENGINEER		STATE PROJ. NO.		(T.H. )		SHEET NO.		OF		SHEETS

PLOTTED/REVISED: 6/22/2020

DISTRICT #: \$@DISTRICT@\$  
PLOT NAME: \$\$@PLOT\$NAME@\$  
PATH & FILENAME: \$\$\$@PATH\$FILENAME\$\$\$

GEOTECHNICAL PARAMETERS:

A SUBSURFACE INVESTIGATION SHOULD BE PERFORMED WITHIN 30 FT. HORIZONTALLY FROM EACH POST FOUNDATION. THE SOIL BORING OR CONE SOUNDING SHOULD PENETRATE A MINIMUM DEPTH OF 35 FT.

FOR DRILLED SHAFTS, THE WATER TABLE SHALL BE 1.5 FT. BELOW FINISHED GRADE OR LOWER.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET HAVE BEEN DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

DRILLED SHAFTS:

COHESIVE SOILS:

MIN. SHEAR STRENGTH: C = 1.0 ksf  
UNIT WEIGHT OF SOIL: γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION: φ = 30°  
UNIT WEIGHT OF SOIL: γ = 125 pcf  
MAX. COEFFICIENT OF FRICTION: μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED IN CASES WHERE THE REQUIRED VALUES AND/OR CONDITIONS LISTED ABOVE ARE NOT MET.

NOTES:

SEE SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION REGARDING DRILLED SHAFT FOUNDATIONS.

PERMANENT CASINGS ARE NOT ALLOWED FOR DRILLED SHAFT FOUNDATIONS.

USE PREFORMED JOINT FILLER BETWEEN THE FOUNDATION AND SIDEWALK OR OTHER CONCRETE AREAS.

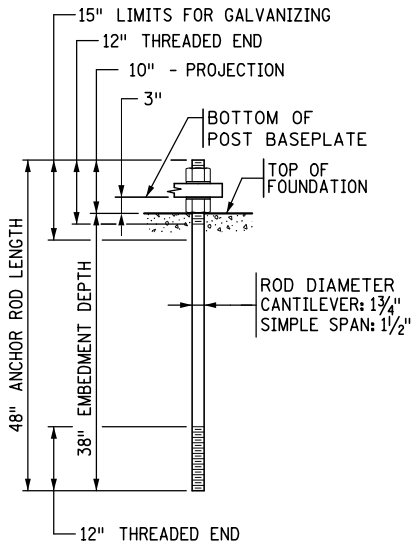
COLD CONCRETE CONSTRUCTION JOINTS ARE NOT PERMITTED.

PROVIDE CONCRETE IN ACCORDANCE WITH SPEC. 2461, MIX 3G52.

PROVIDE 3/4" CHAMFER ON EXPOSED CORNERS.

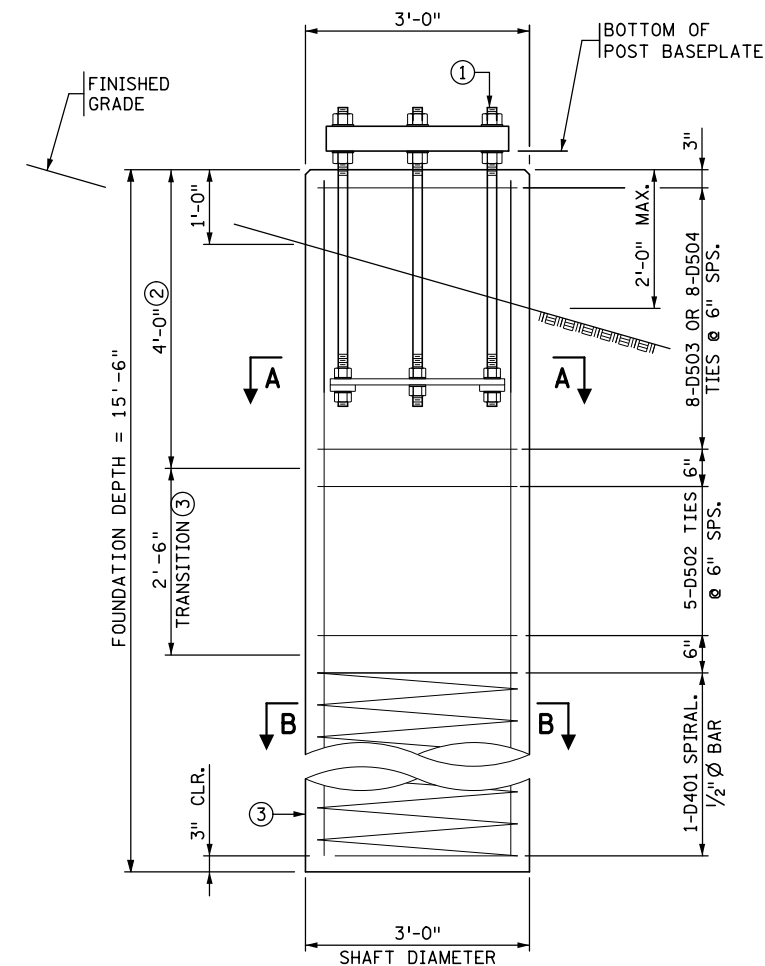
(EF) DENOTES EACH FACE.

- 1 ANCHOR ROD ASSEMBLY. GALVANIZE ANCHOR RODS IN ACCORDANCE WITH SPEC. 3392.
- 2 FORM A MINIMUM OF 6" BELOW THE GROUND SURFACE. BACKFILL AND TAMP THE EXCAVATIONS REQUIRED FOR FORMING PER SPEC. 2105.3.F.2. BACKFILL MATERIAL AND COMPACTION TO BE EQUIVALENT TO THE SURROUNDING MATERIAL.
- 3 EXCAVATE TO NEAT LINES AND PLACE CONCRETE AGAINST UNDISTURBED SOIL.

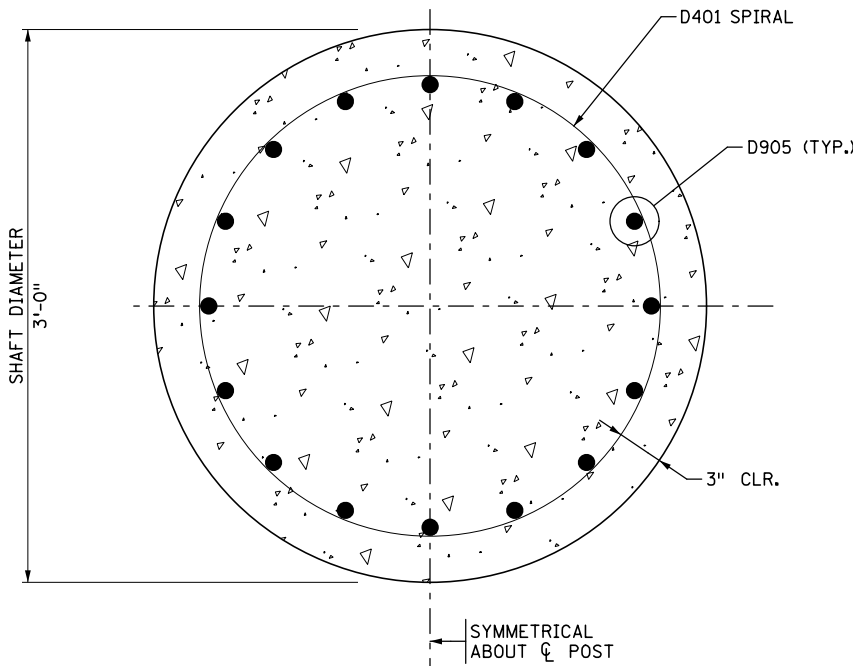


ANCHOR ROD DETAIL

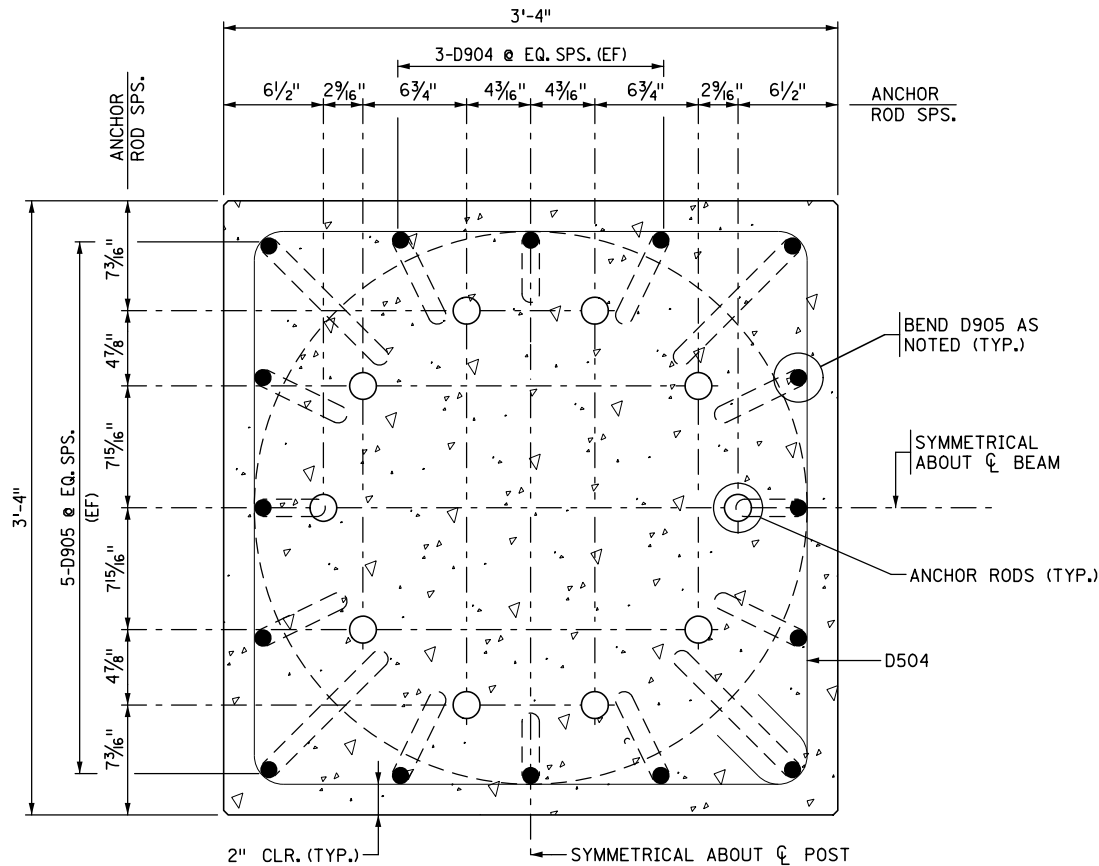
(ROD MATERIAL IN ACCORDANCE WITH SPEC. 3385 TYPE B)



ELEVATION

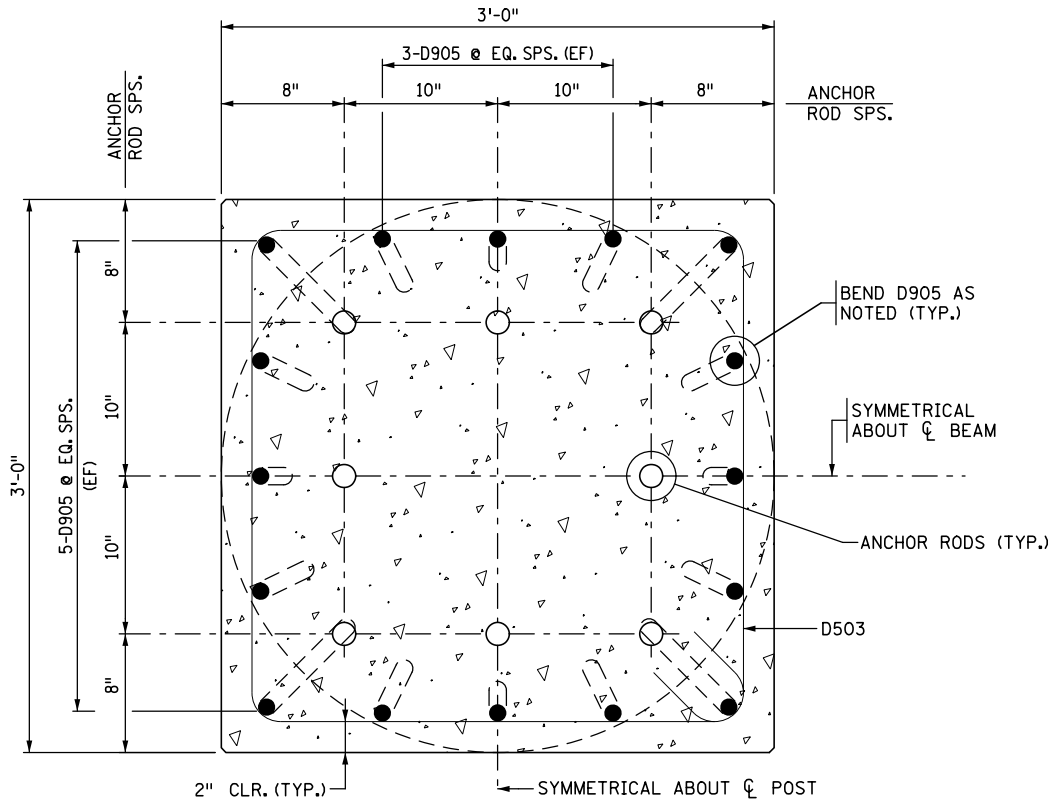


SECTION B-B



SECTION A-A

(CANTILEVER STRUCTURE)



SECTION A-A

(SIMPLE SPAN STRUCTURE)

REVISION:
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STATE BRIDGE ENGINEER



STANDARD PLAN 5-297.746

1 OF 2

APPROVED: 12-31-2099  
REVISED:

MONOTUBE OVERHEAD SIGN STRUCTURES  
FOUNDATION DETAILS

STATE DESIGN ENGINEER

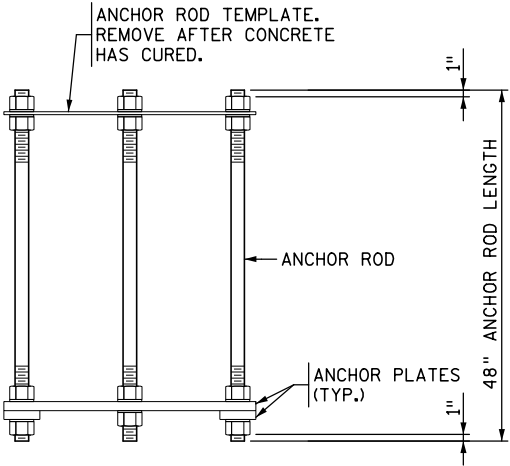
STATE PROJ. NO.

(T.H. )

SHEET NO. OF SHEETS

PLOTTED/REVISED: 6/22/2020

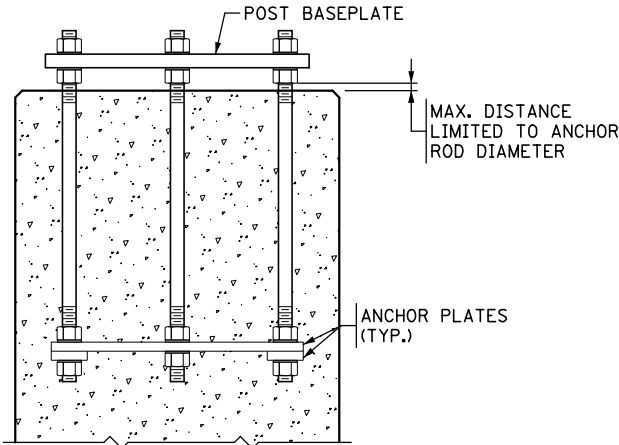
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PLOT NAME: \$\$\$PLOT\$NAME\$\$\$  
PATH & FILENAME: \$\$\$PATH\$FILENAME\$\$\$



EACH ANCHOR ROD TO BE PROVIDED WITH (4) HEAVY HEX NUTS, AND (4) HARDENED FLAT WASHERS. (1) SET OF ANCHOR PLATES AND ONE ANCHOR ROD TEMPLATE TO BE PROVIDED PER ASSEMBLY. GALVANIZE ALL EXPOSED HEX NUTS AND WASHERS. GALVANIZE 15" OF EXPOSED ANCHOR ROD END. DO NOT GALVANIZE ANCHOR PLATES, WASHERS, AND HEX NUTS EMBEDDED IN CONCRETE.

ANCHOR ROD ASSEMBLY

(ROD MATERIAL IN ACCORDANCE WITH SPEC. 3385 TYPE B)



REMOVE ANCHOR ROD TEMPLATE IN PREPARATION FOR THE POST PLACEMENT. PLACE POST BASE PLATE LEVEL. TIGHTEN HEX NUTS PER THE SPECIAL PROVISIONS.

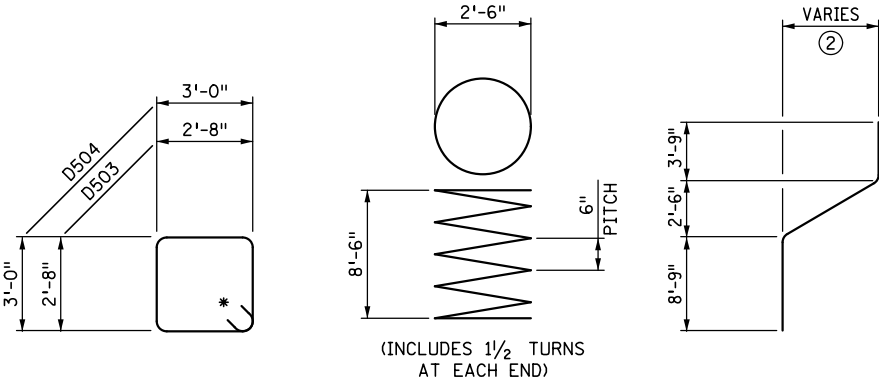
PARTIAL ELEVATION

(SHOWING BASE PLATE & ANCHOR ROD ASSEMBLY)

FOUNDATION QUANTITIES		
ITEM DESCRIPTION	UNIT	QUANTITY
STRUCTURAL CONCRETE (3G52)	CU YD	5.0
REINFORCEMENT BARS	POUND	1030
ANCHORAGE ASSEMBLY - CANTILEVER	POUND	660
ANCHORAGE ASSEMBLY - SIMPLE SPAN	POUND	350

BILL OF REINFORCEMENT - FOUNDATION				
BAR	QTY.	LENGTH	SHAPE	LOCATION
D401	1	8'-6"	SPIRAL	DRILLED SHAFT SPIRAL
D502	5	12'-1"	—	TRANSITION TIES
D503	8	11'-11"	□	PEDESTAL TIES - SIMPLE SPAN
D504	8	13'-3"	□	PEDESTAL TIES - CANTILEVER
D905	16	15'-1"	—	DRILLED SHAFT VERTICALS

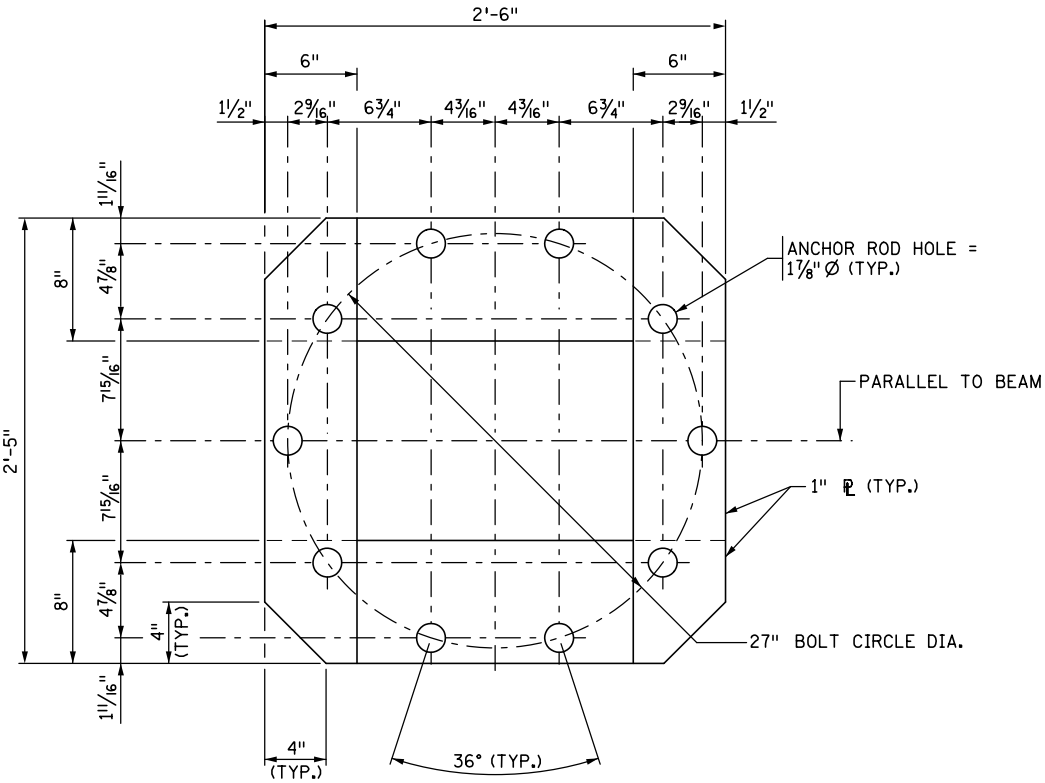
①



D503 & D504

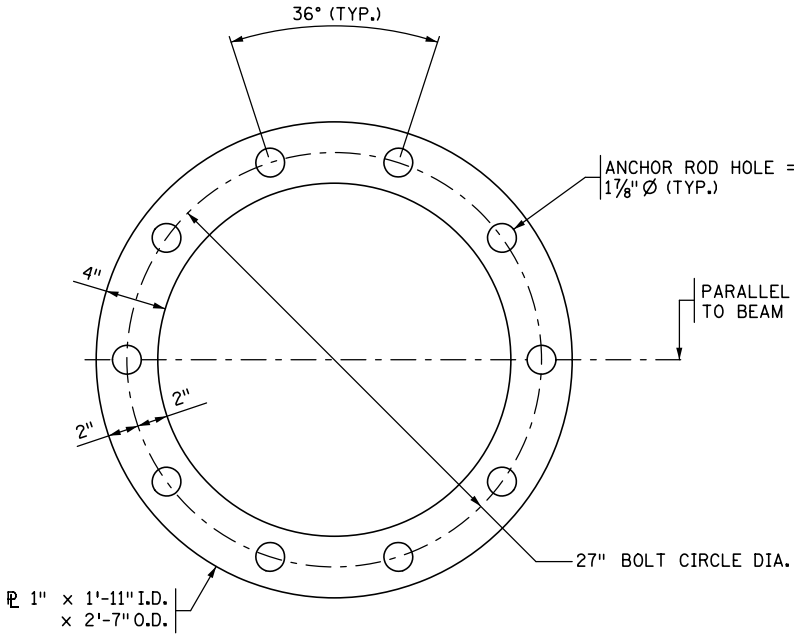
D401

D905



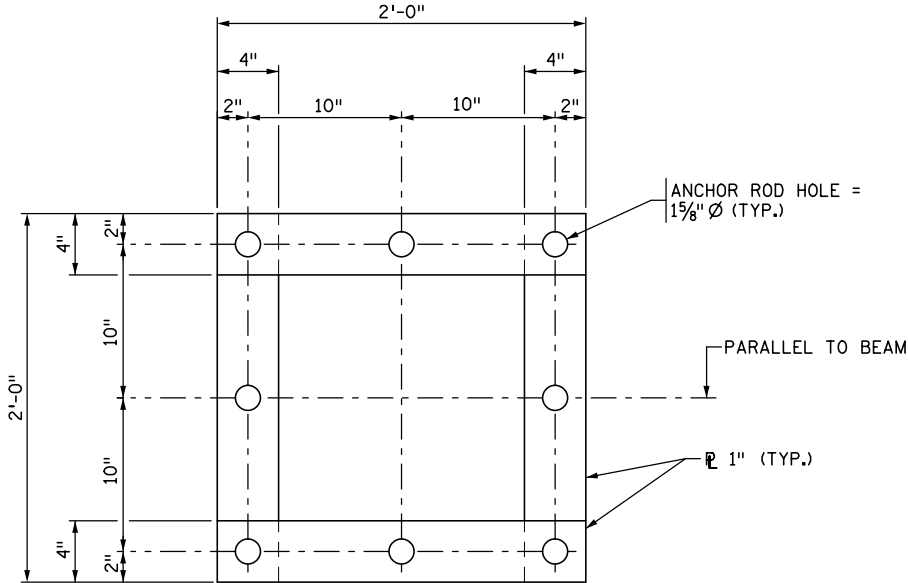
ANCHOR PLATE PLAN

(FOR CANTILEVER STRUCTURE - RECTANGULAR PLATE ALTERNATE)



ANCHOR PLATE PLAN

(FOR CANTILEVER STRUCTURE - CIRCULAR PLATE ALTERNATE)




ANCHOR PLATE PLAN

(FOR SIMPLE SPAN STRUCTURE)

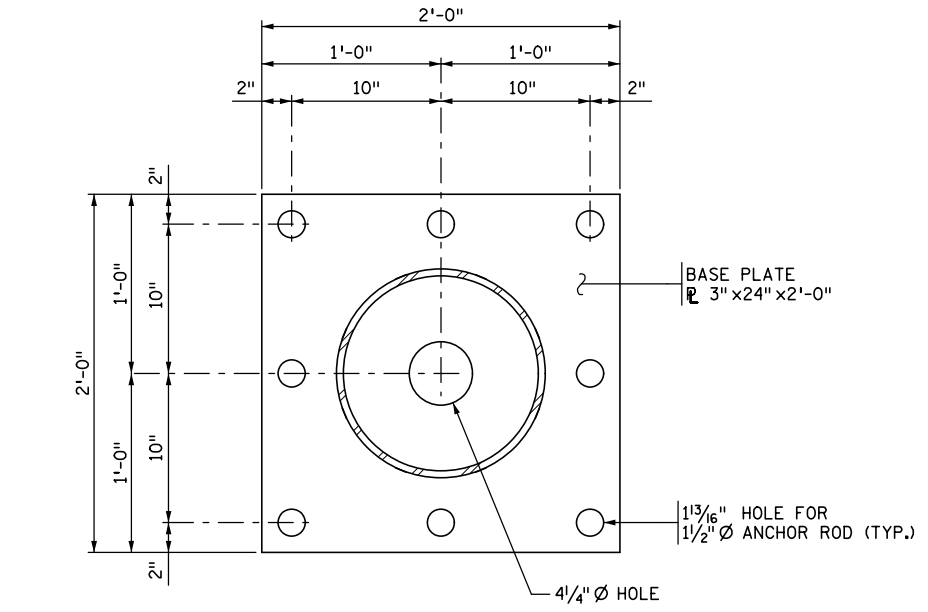
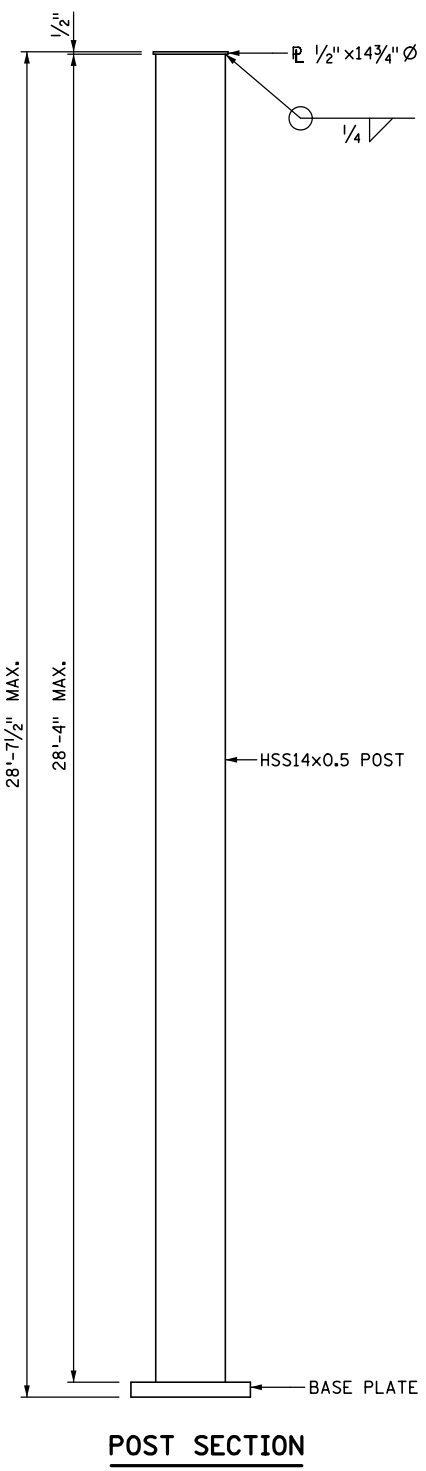
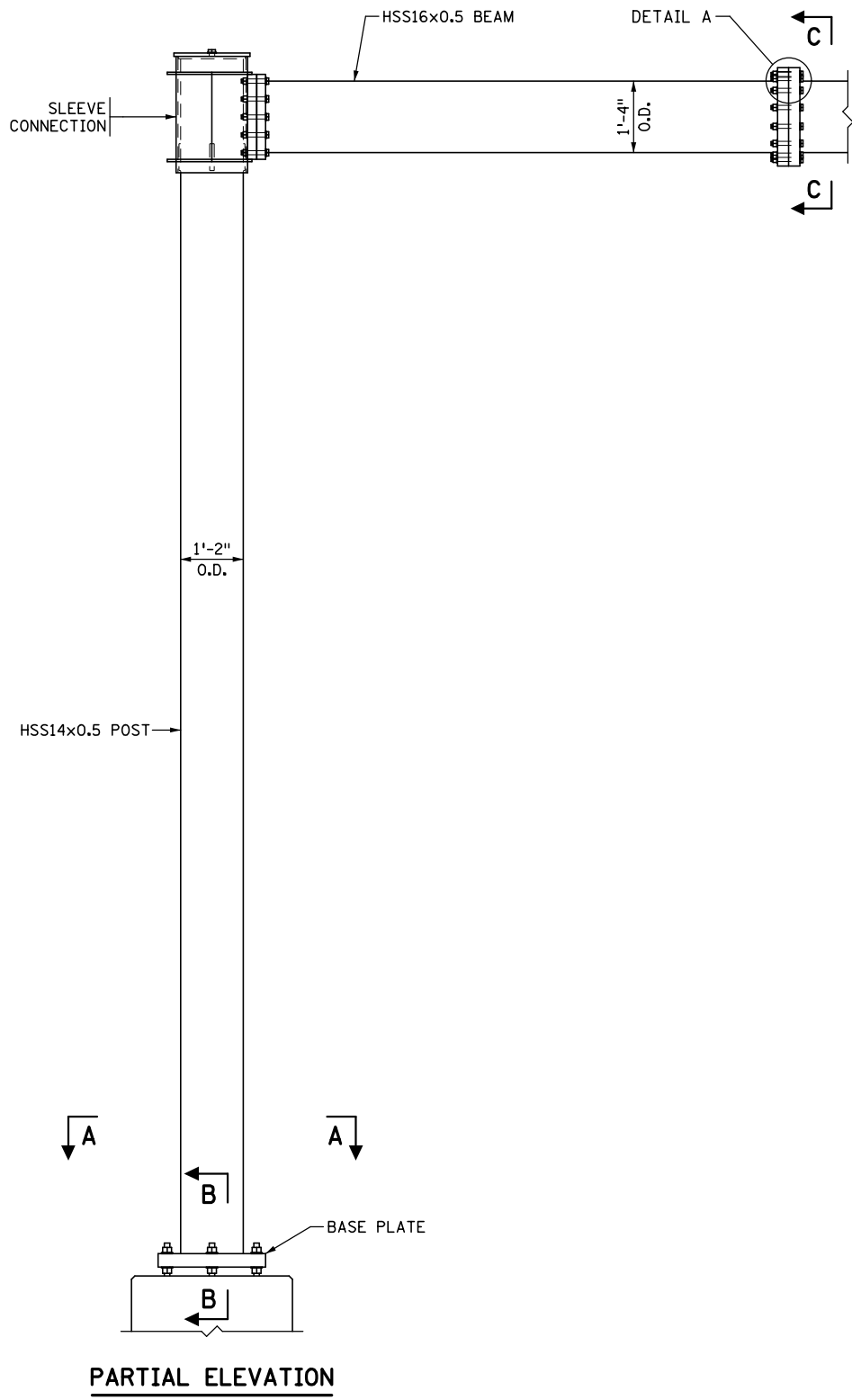
ANCHOR ROD DETAILS

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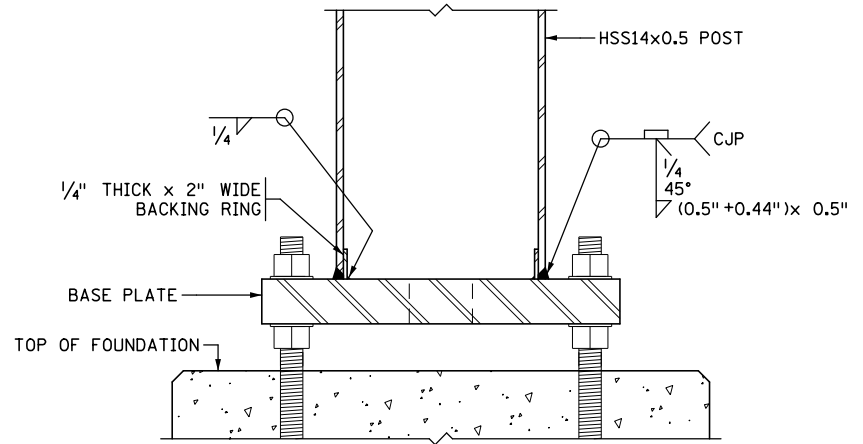
 <b>MINNESOTA</b>  DEPARTMENT OF TRANSPORTATION	STANDARD PLAN 5-297.746	2 OF 2	<b>MONOTUBE OVERHEAD SIGN STRUCTURES</b> FOUNDATION DETAILS		
	APPROVED: 12-31-2099 REVISED:				
STATE DESIGN ENGINEER	STATE PROJ. NO.		(T.H. )	SHEET NO.	OF SHEETS

DISTRICT #: \$@DISTRICT\$\$\$  
PLOT NAME: \$\$\$PLOT\$NAME\$\$\$  
PATH & FILENAME: \$\$\$@PATH\$FILENAME\$\$\$

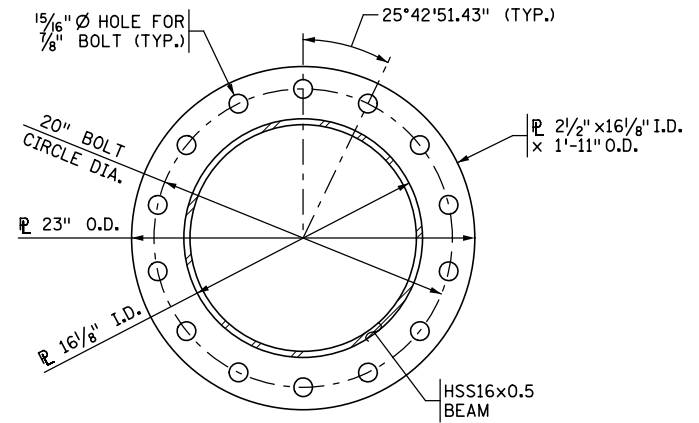
PLOTTED/REVISED: 6/22/2020



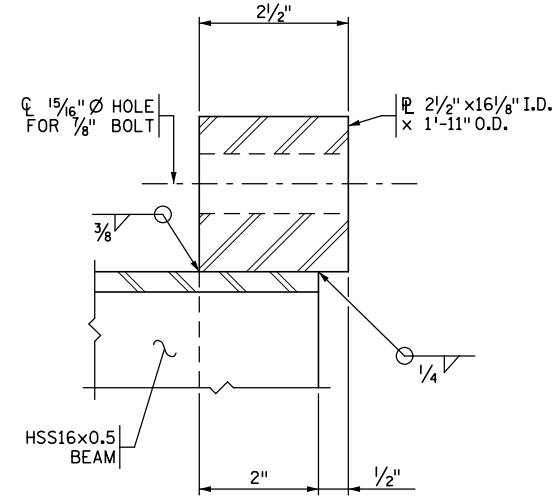
SECTION A-A  
(ANCHOR RODS NOT SHOWN FOR CLARITY)



SECTION B-B  
(DRILLED SHAFT REINFORCEMENT NOT SHOWN FOR CLARITY)



SECTION C-C  
(TYPICAL BEAM SPLICE PLATE SECTION)



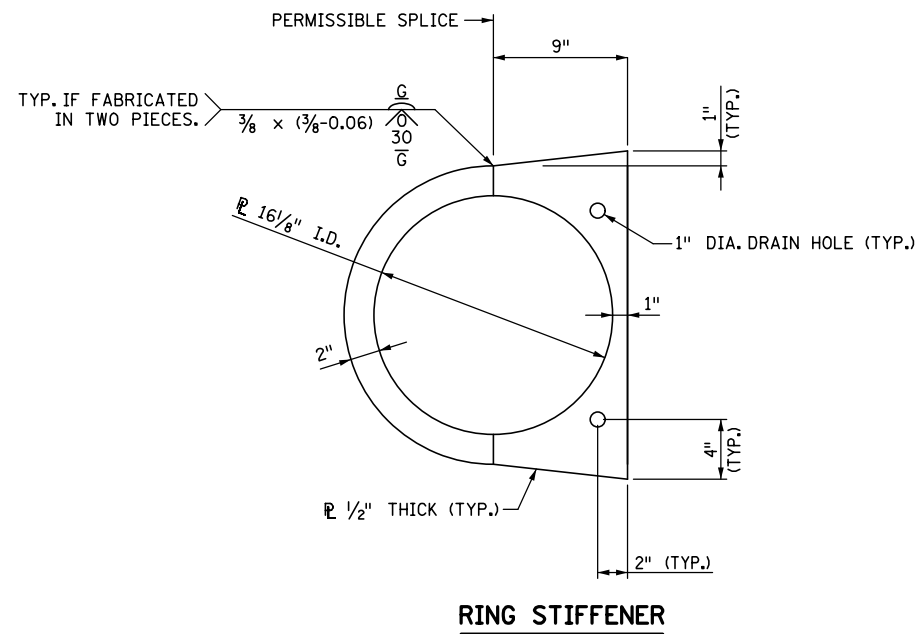
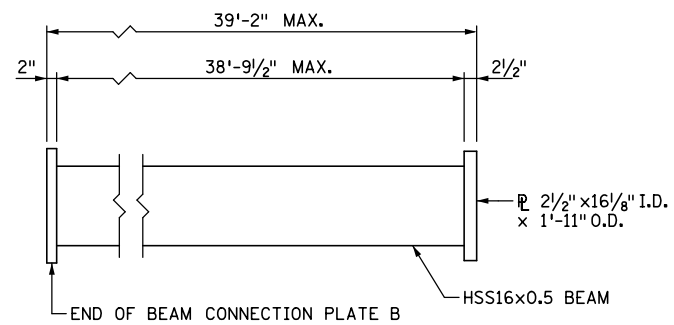
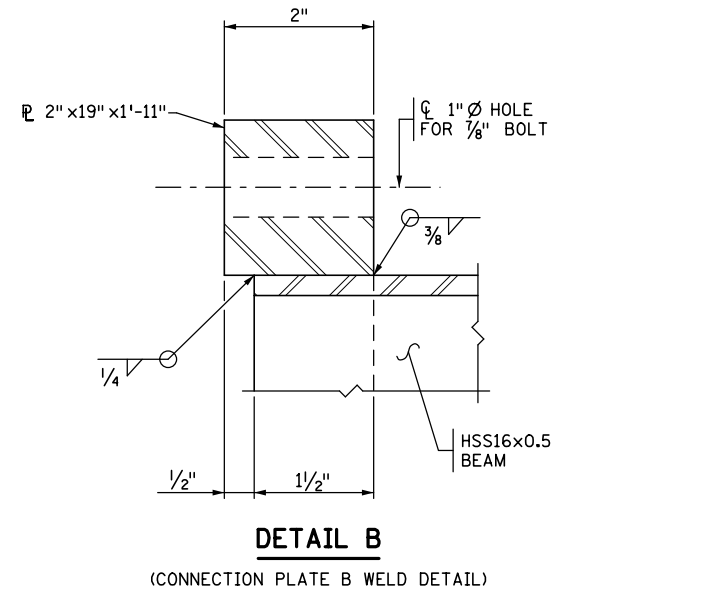
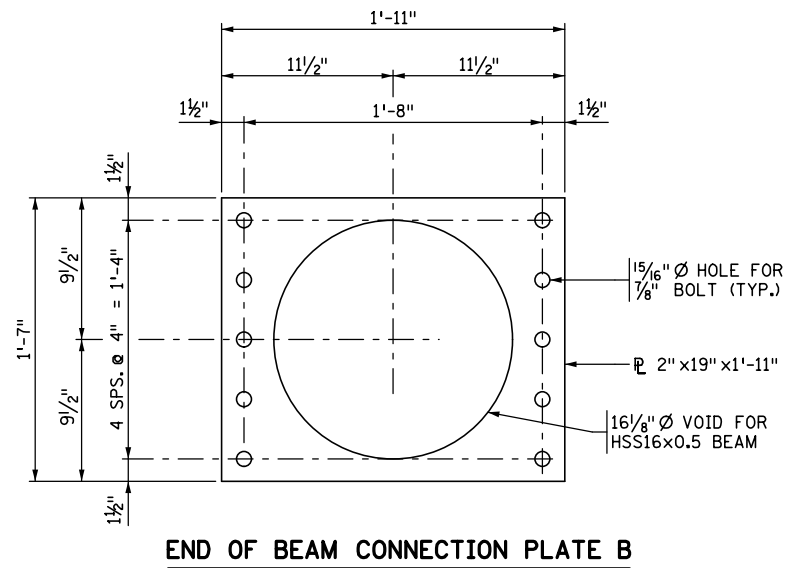
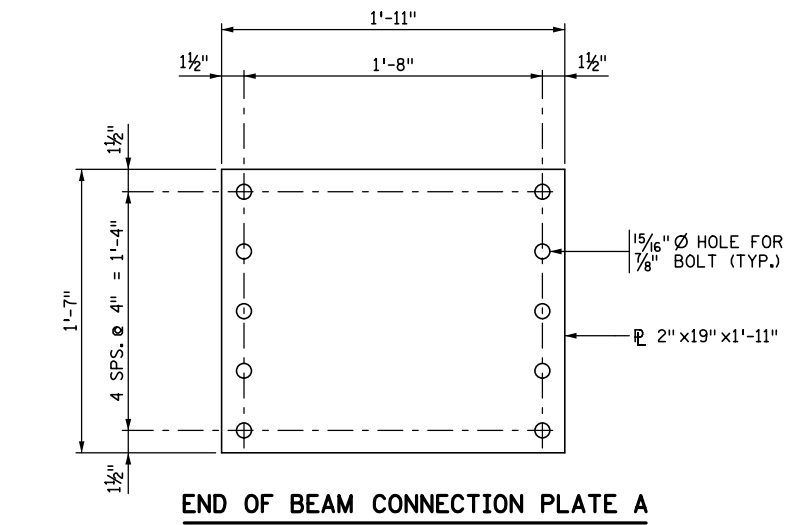
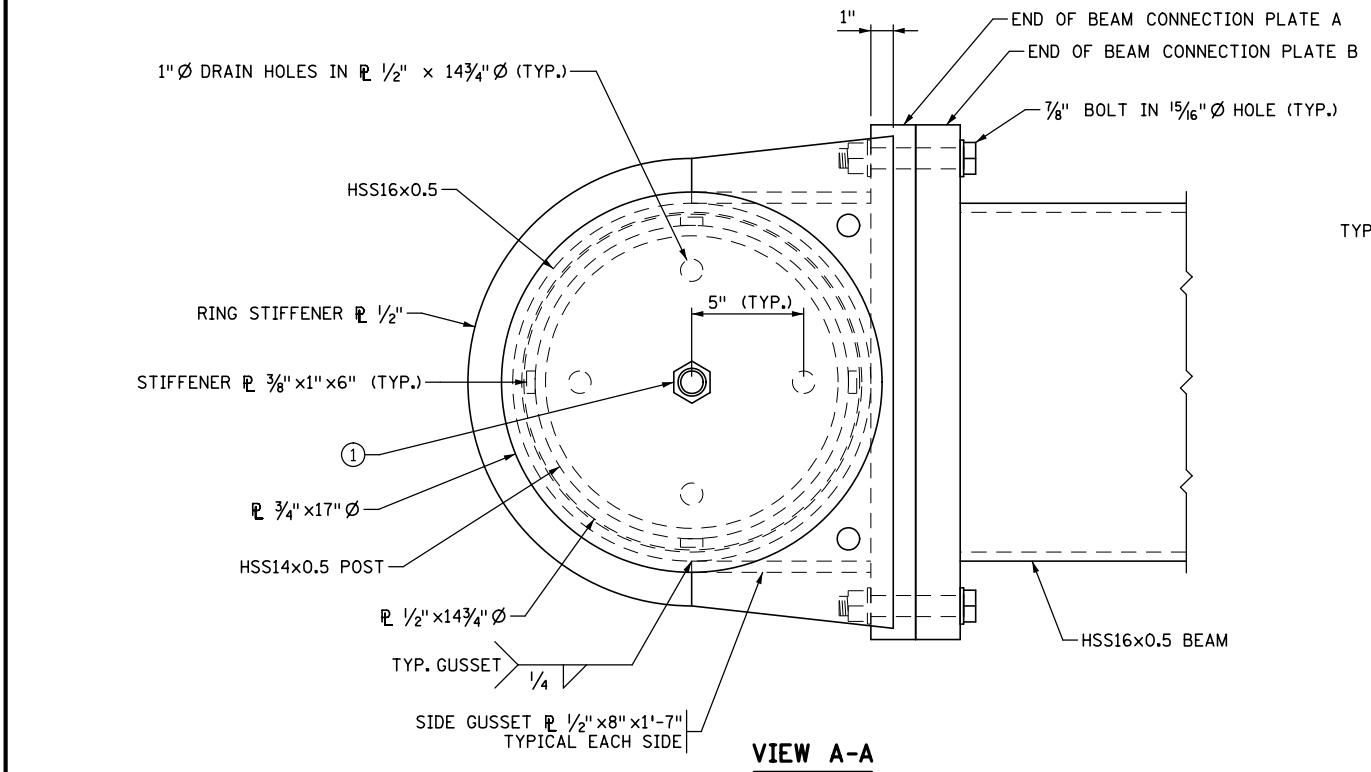
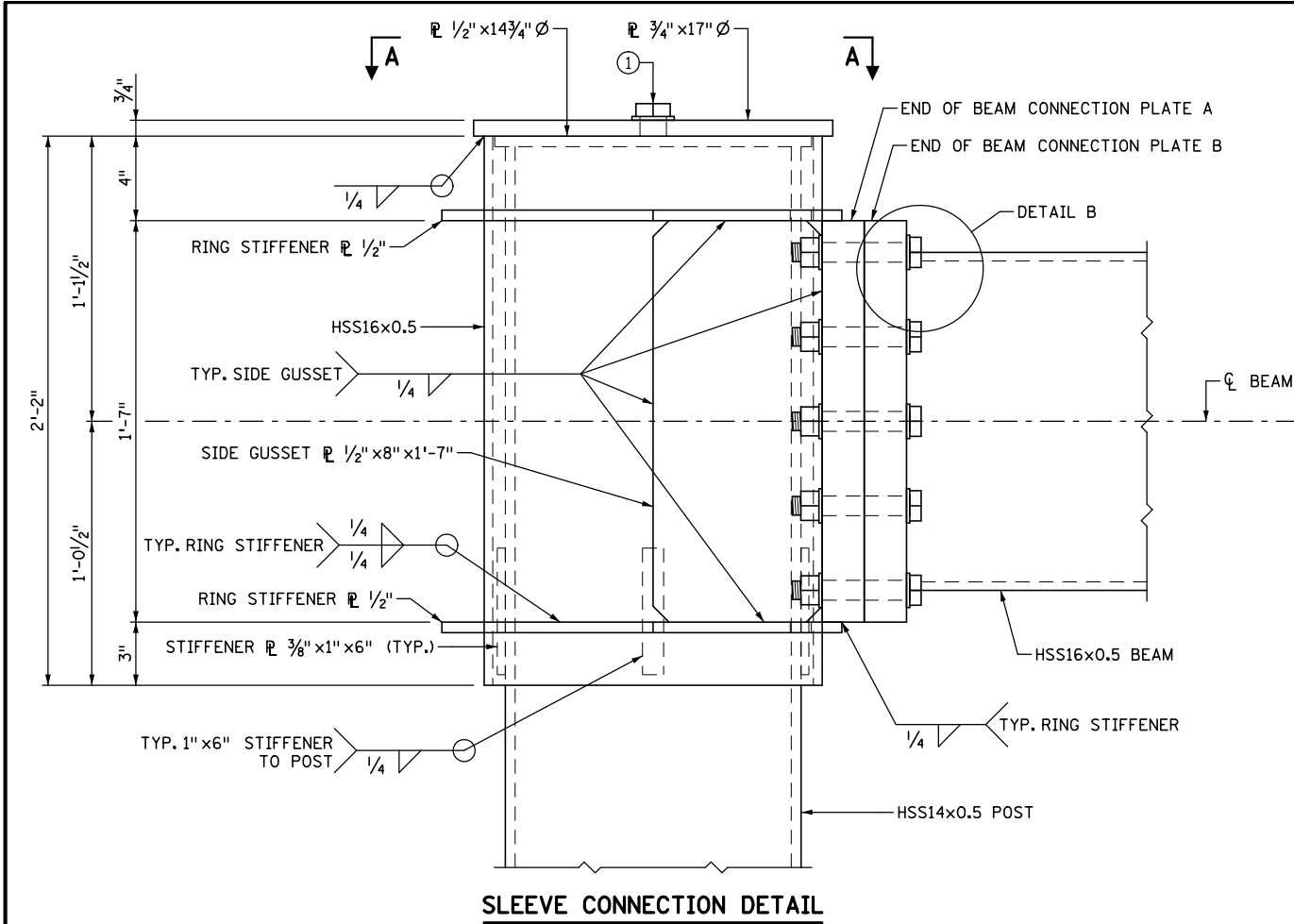
DETAIL A  
(TYPICAL BEAM SPLICE PLATE WELD DETAIL)

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STATE BRIDGE ENGINEER

MINNESOTA DEPARTMENT OF TRANSPORTATION	STANDARD PLAN 5-297.747	1 OF 2	MONOTUBE OVERHEAD SIGN STRUCTURES SIMPLE SPAN - POST AND BASEPLATE DETAILS	
	APPROVED: 12-31-2099 REVISED:			
STATE DESIGN ENGINEER	STATE PROJ. NO.	(T.H. )	SHEET NO.	OF SHEETS

PLOTTED/REVISED: 6/22/2020

DISTRICT #: \$@DISTRICT\$\$\$  
PLOT NAME: \$@PLOT\$NAME\$\$\$  
PATH & FILENAME: \$@PA\$TH\$FILE\$NAME\$\$\$



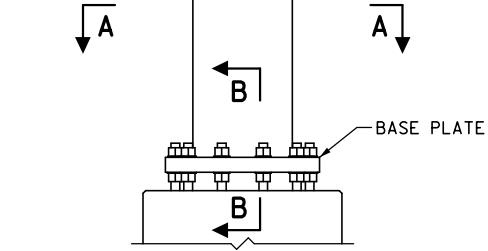
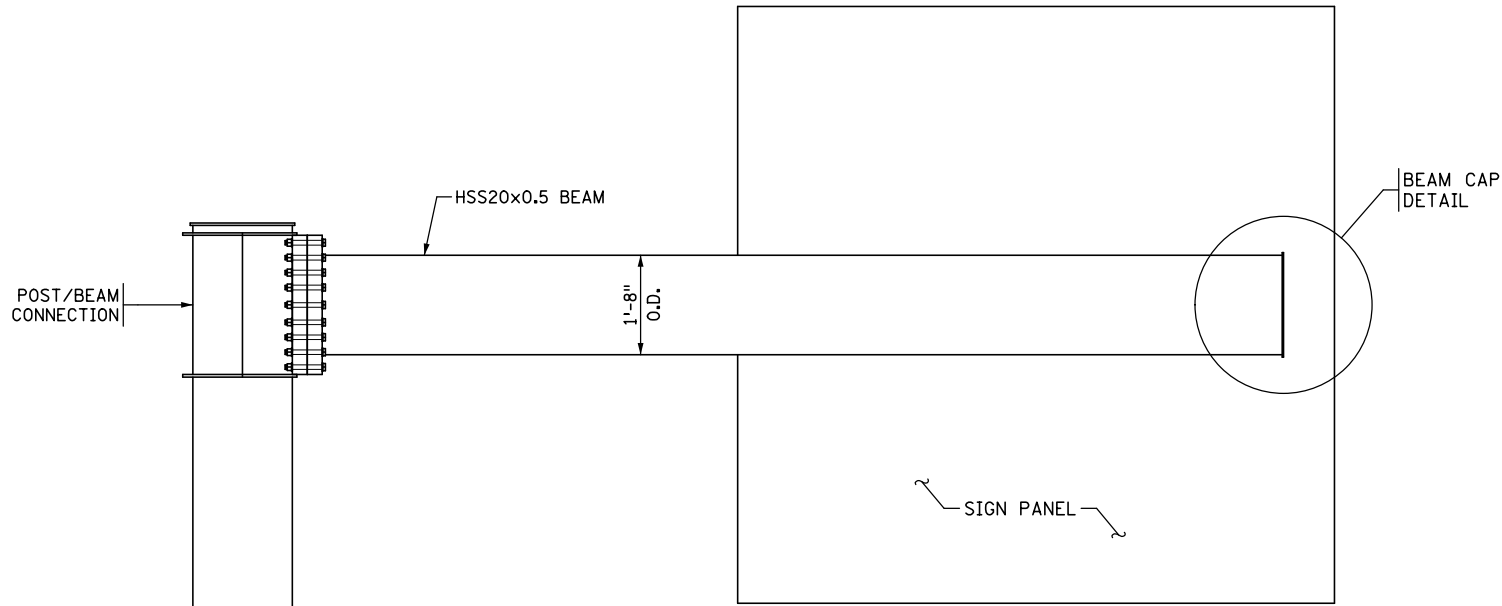
**NOTES:**  
① 1/16" DIA. HOLE CENTERED IN 3/4" x 17" DIA. HOLE CENTERED IN 1/2" x 14 3/4" DIA. DRILLED AND TAPPED FOR 7/8" DIA. x 2" BOLT.

REVISION:
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	STANDARD PLAN 5-297.747	2 OF 2	MONOTUBE OVERHEAD SIGN STRUCTURES SIMPLE SPAN - BEAM DETAILS	
	APPROVED: 12-31-2099 REVISED:			
STATE DESIGN ENGINEER	STATE PROJ. NO.	(T.H.)	SHEET NO.	OF SHEETS

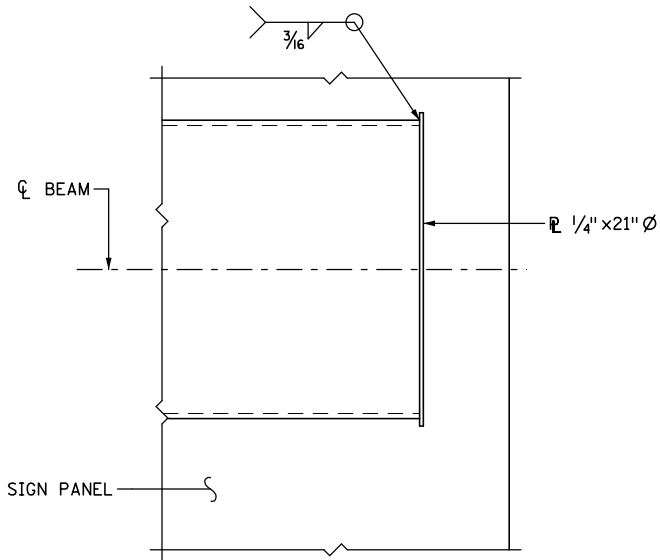
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PLOTTED/REVISED: 6/22/2020

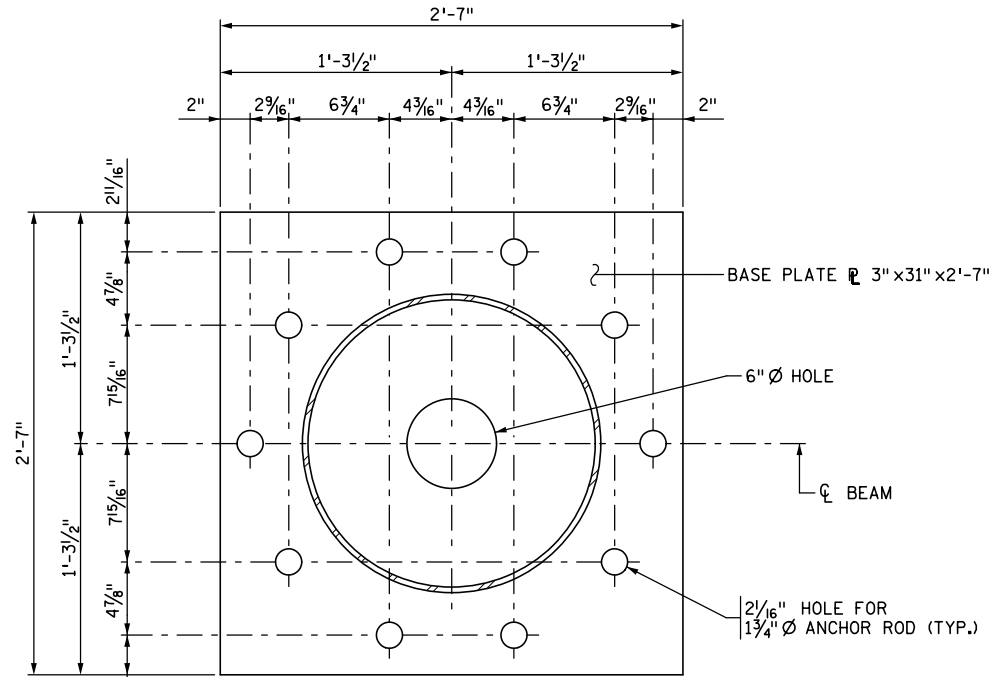


PARTIAL ELEVATION

(SIGN MOUNTING POSTS NOT SHOWN FOR CLARITY)

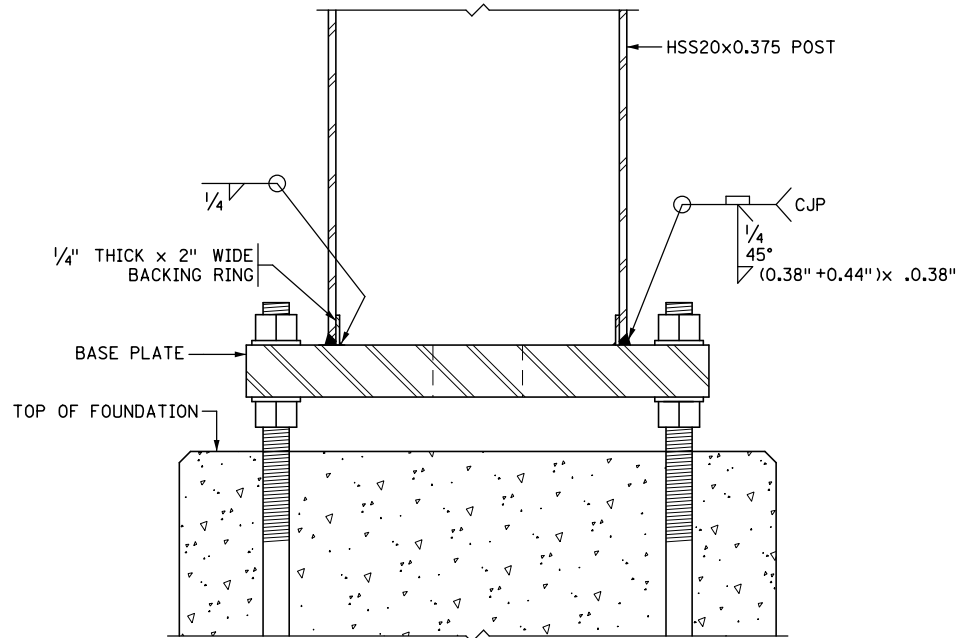


BEAM CAP DETAIL



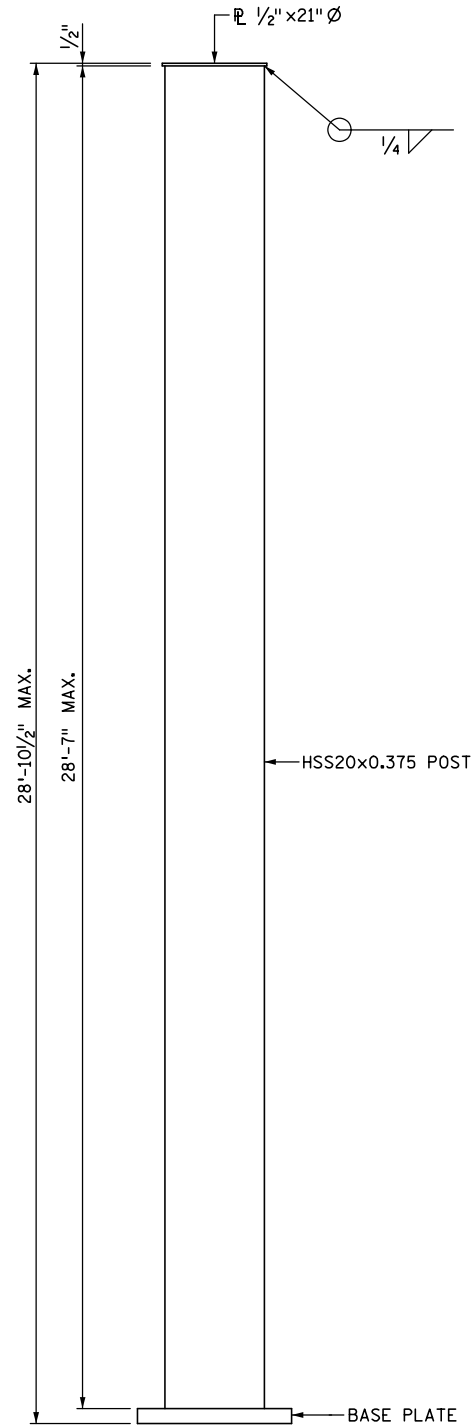
SECTION A-A

(ANCHOR RODS NOT SHOWN FOR CLARITY)



SECTION B-B

(DRILLED SHAFT REINFORCEMENT NOT SHOWN FOR CLARITY)

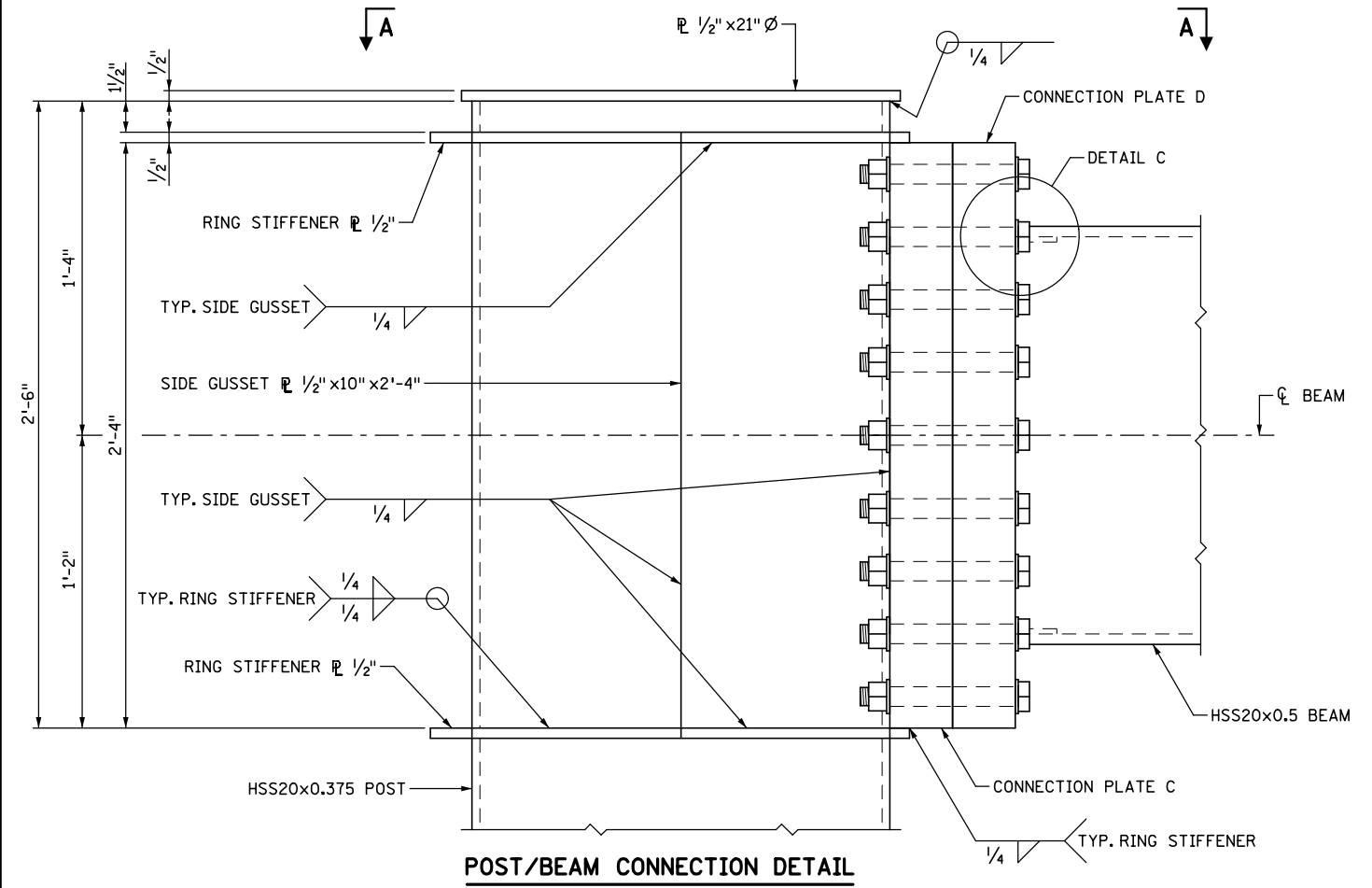


POST SECTION

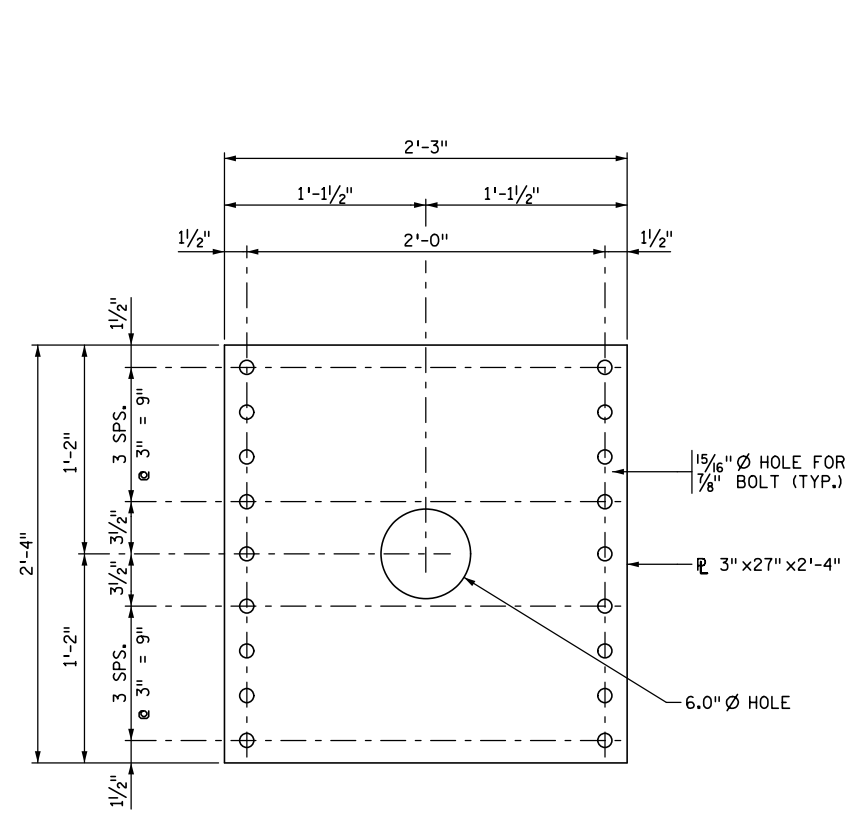
REVISION:
APPROVED: XXXXX XX, 2020
STATE BRIDGE ENGINEER

MINNESOTA DEPARTMENT OF TRANSPORTATION	STANDARD PLAN 5-297.748	1 OF 2	MONOTUBE OVERHEAD SIGN STRUCTURES CANTILEVER - POST AND BASEPLATE DETAILS	
	APPROVED: 12-31-2099 REVISED:			
STATE DESIGN ENGINEER	STATE PROJ. NO.	(T.H. )	SHEET NO.	OF SHEETS

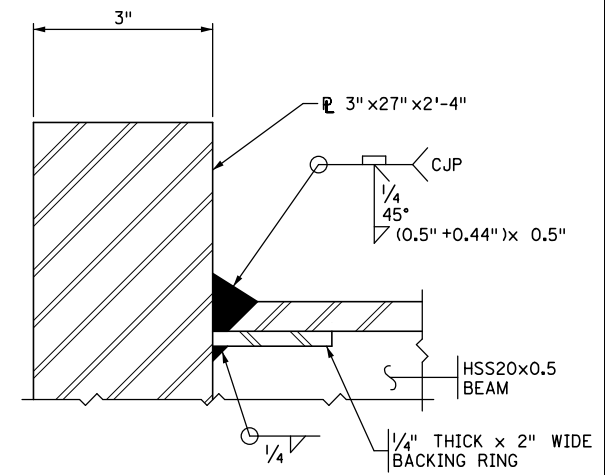
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PATH & FILENAME:



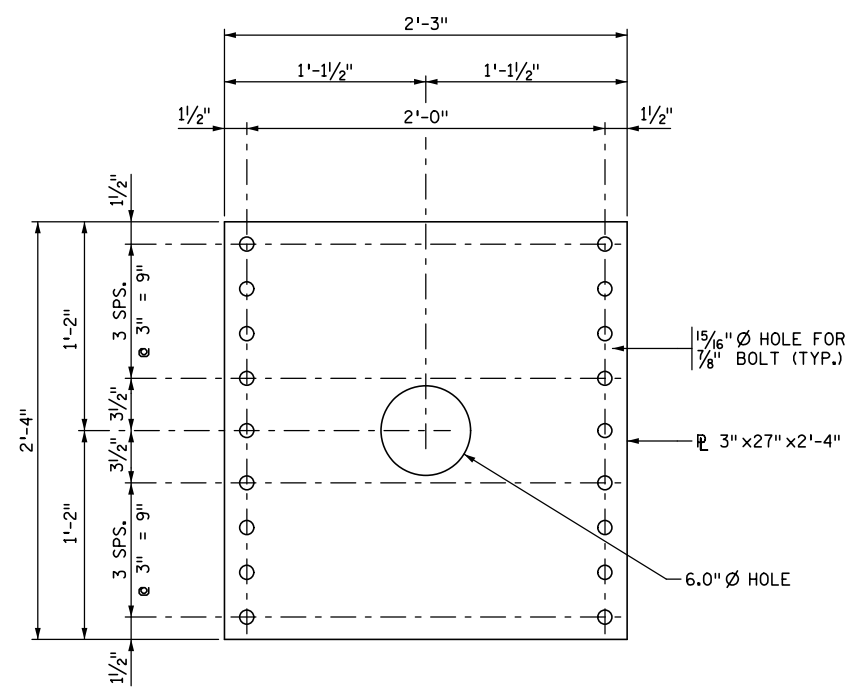
POST/BEAM CONNECTION DETAIL



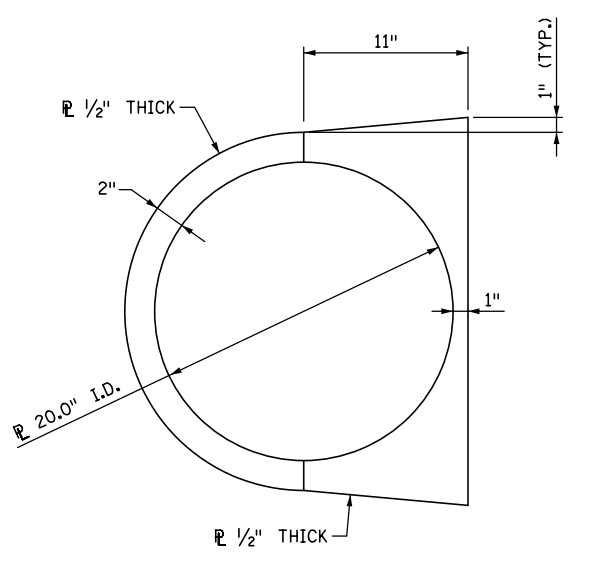
END OF BEAM CONNECTION PLATE C



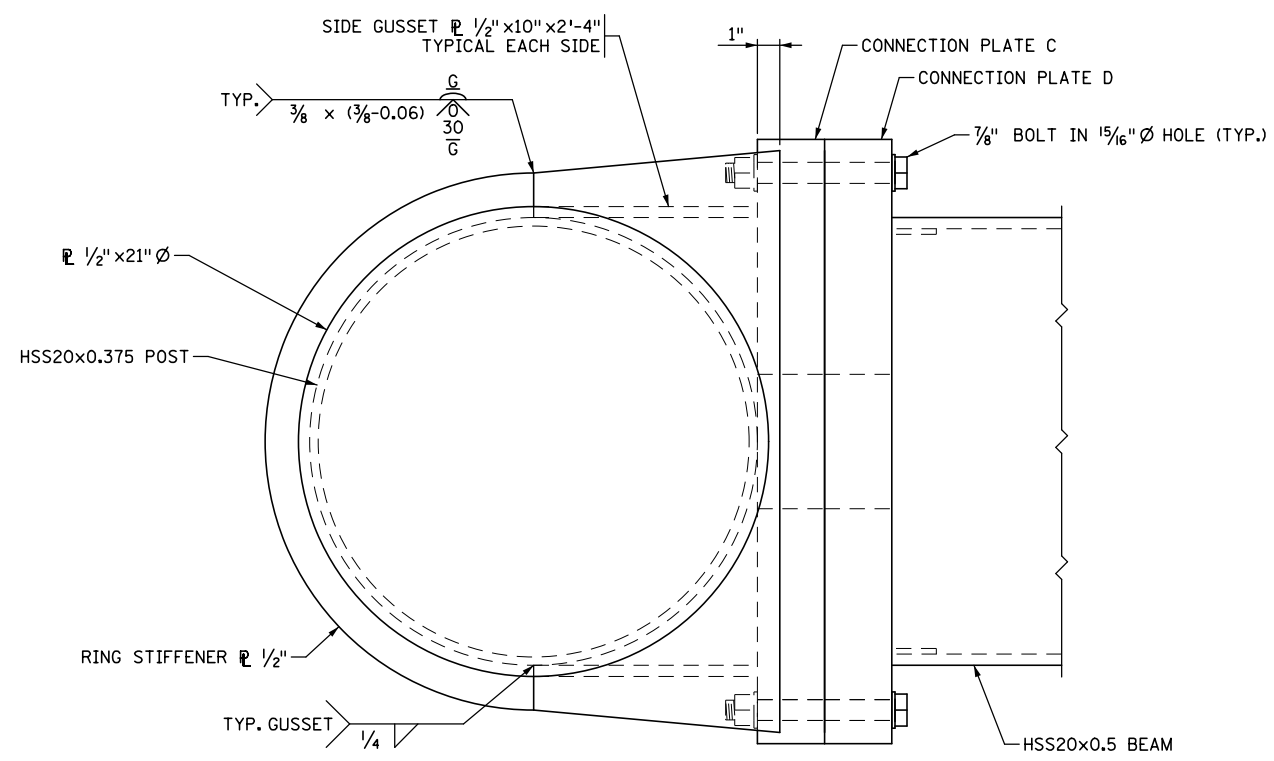
DETAIL C  
(CONNECTION PLATE D WELD DETAIL)



END OF BEAM CONNECTION PLATE D



RING STIFFENER

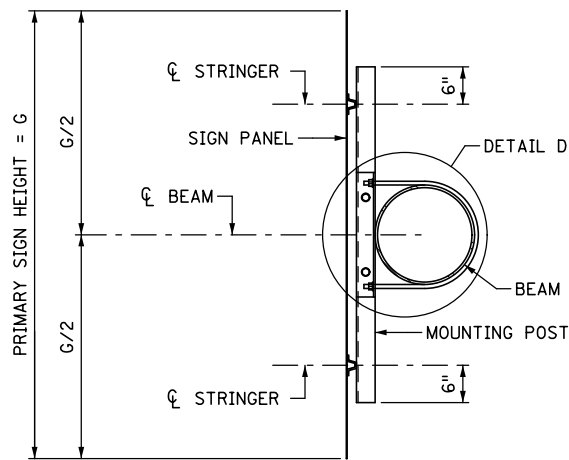


VIEW A-A

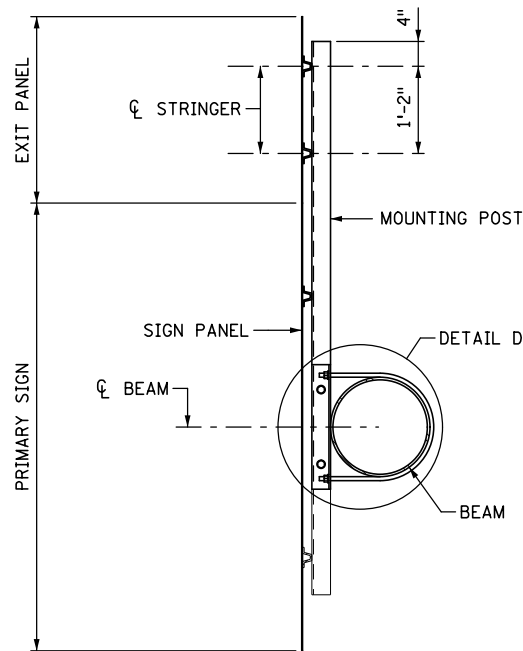
REVISION:
APPROVED: XXXXX XX, 2020
STATE BRIDGE ENGINEER

MINNESOTA DEPARTMENT OF TRANSPORTATION	STANDARD PLAN 5-297.748	2 OF 2	MONOTUBE OVERHEAD SIGN STRUCTURES CANTILEVER - BEAM DETAILS	
	APPROVED: 12-31-2099 REVISED:			
STATE DESIGN ENGINEER	STATE PROJ. NO.	(T.H.)	SHEET NO.	OF SHEETS

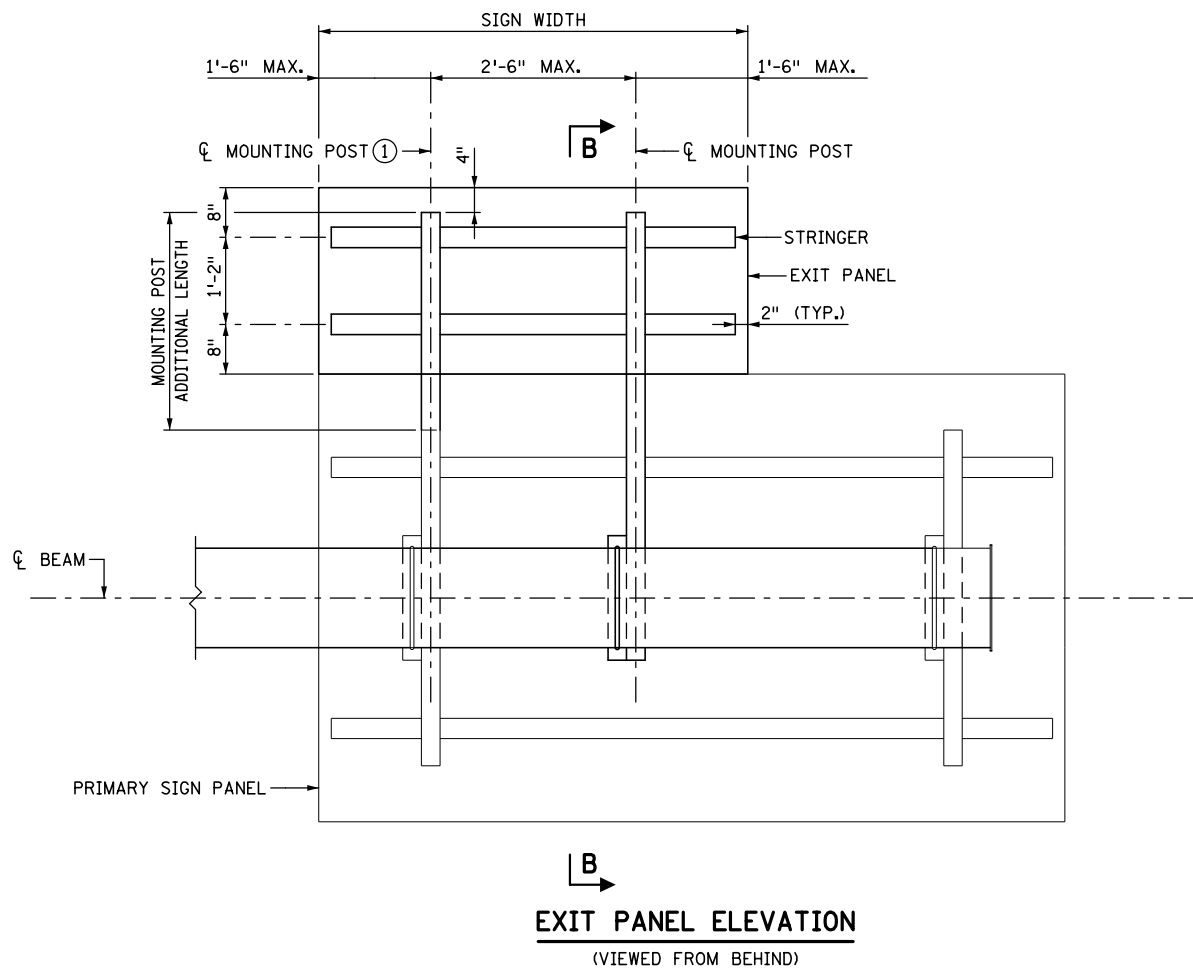
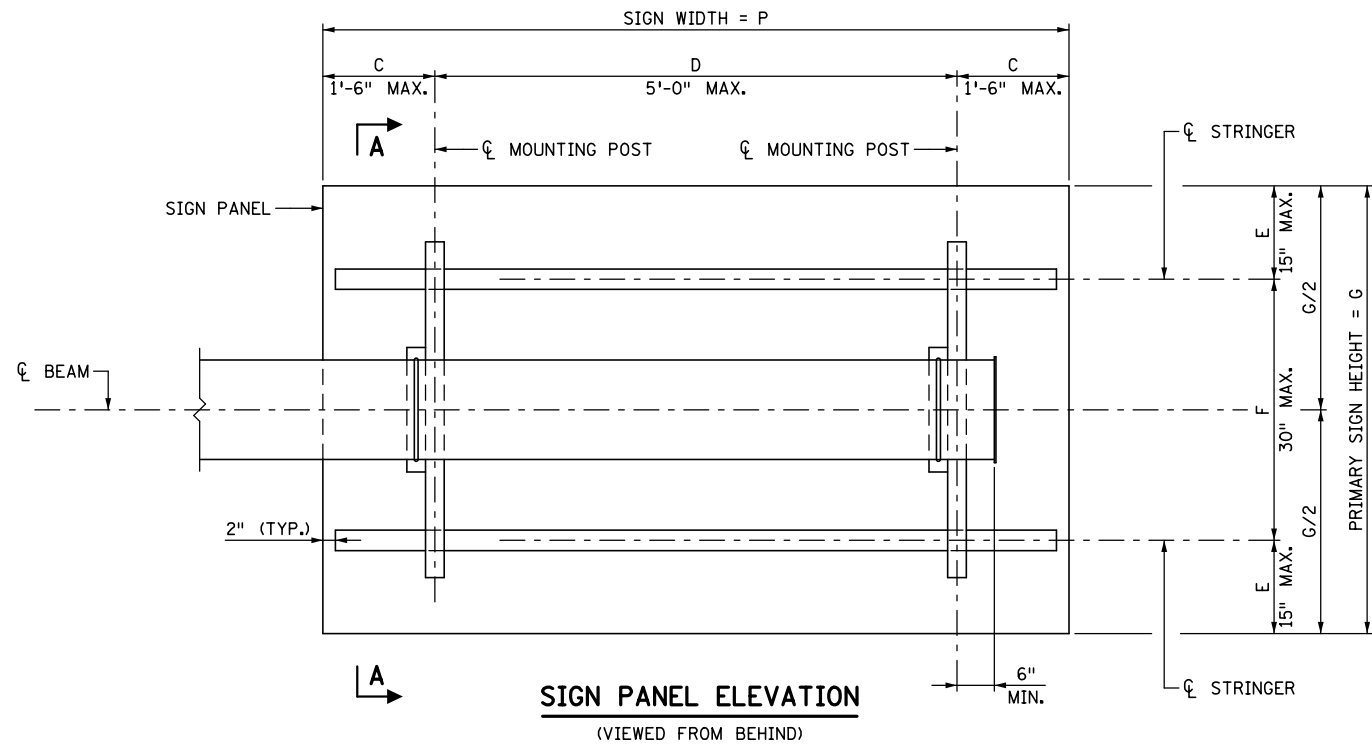
DISTRICT #:   
PLOT NAME:   
PATH & FILENAME:



SECTION A-A



SECTION B-B



MOUNTING POST SPACING			
NUMBER	P	C	D
2	96" OR LESS	0.188P	0.624P
3	102" THRU 156"	0.115P	0.385P
4	162" THRU 216"	0.100P	0.267P
5	222" THRU 240"	0.065p	0.217P
MOUNTING POST SPACING MAY BE ADJUSTED AS REQUIRED IF CONFLICT WITH BEAM MEMBERS IS ENCOUNTERED.			

STRINGER SPACING			
NUMBER	SIGN HEIGHT, G (IN.)	E (IN.)	F (IN.)
1	24	12	0
1	30	15	0
2	36	8	20
2	42	9	24
2	48	12	24
2	54	12	30
2	60	15	30
3	66	12	21
3	72	12	24
3	78	12	27
3	84	12	30
3	90	15	30
4	96	12	24
4	102	12	26
4	108	12	28
4	114	12	30
4	120	15	30
5	126	15	24
5	132	12	27
5	138	15	27
5	144	12	30
5	150	15	30
6	156	13	26
6	162	11	28
6	168	14	28
6	174	12	30
6	180	15	30

NOTES:

- ① USE MOUNTING POSTS FOR BOTH PRIMARY SIGN PANEL AND EXIT PANEL WHERE POSSIBLE. EXTEND PRIMARY SIGN MOUNTING POST TO ACCOMMODATE EXIT PANEL.

REVISION:
APPROVED: XXXXX XX, 2020
STATE BRIDGE ENGINEER

MINNESOTA DEPARTMENT OF TRANSPORTATION	STANDARD PLAN 5-297.749	1 OF 2
	APPROVED: 12-31-2099 REVISED:	
STATE DESIGN ENGINEER	STATE PROJ. NO.	

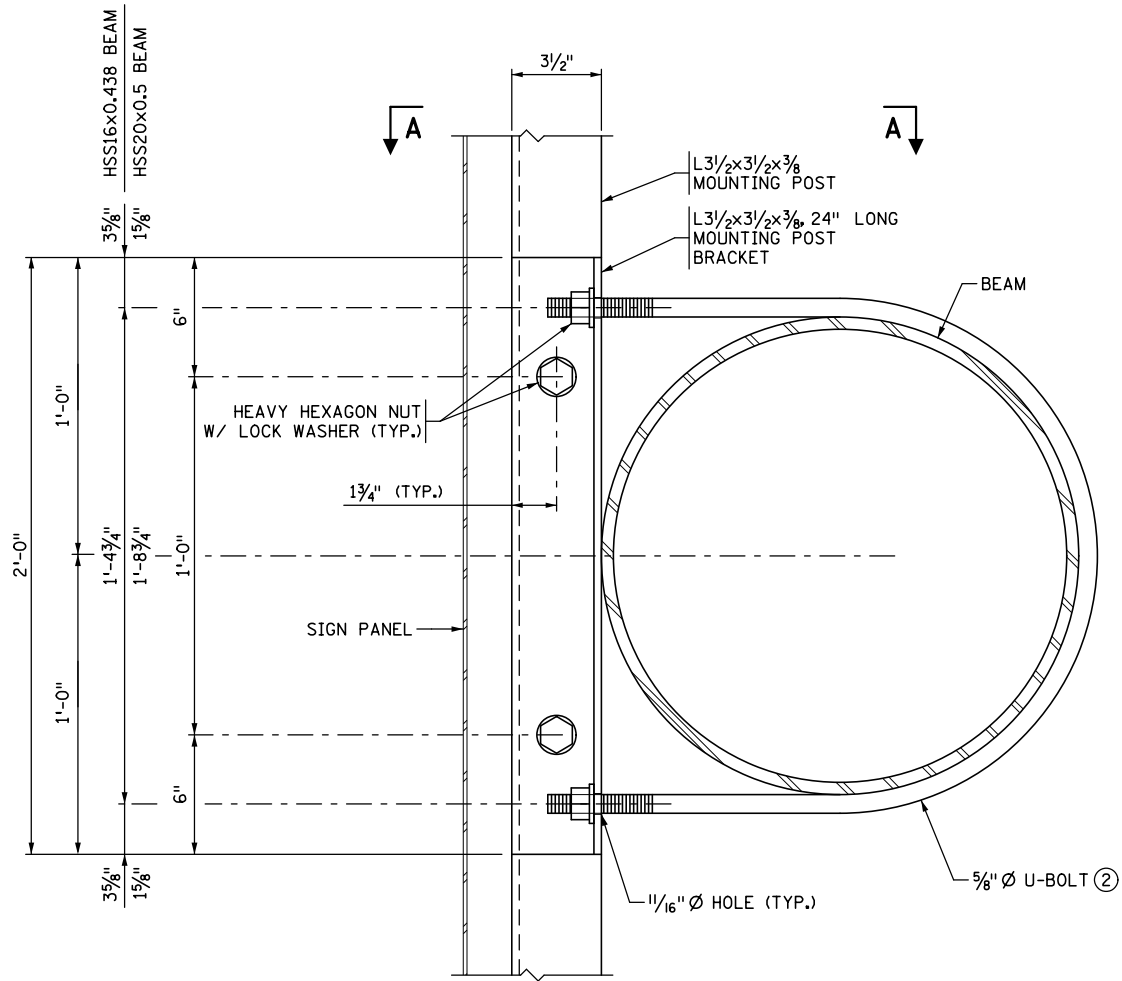
MONOTUBE OVERHEAD SIGN STRUCTURES  
SIGN PANEL AND EXIT PANEL GEOMETRY

(T.H. ) SHEET NO. OF SHEETS

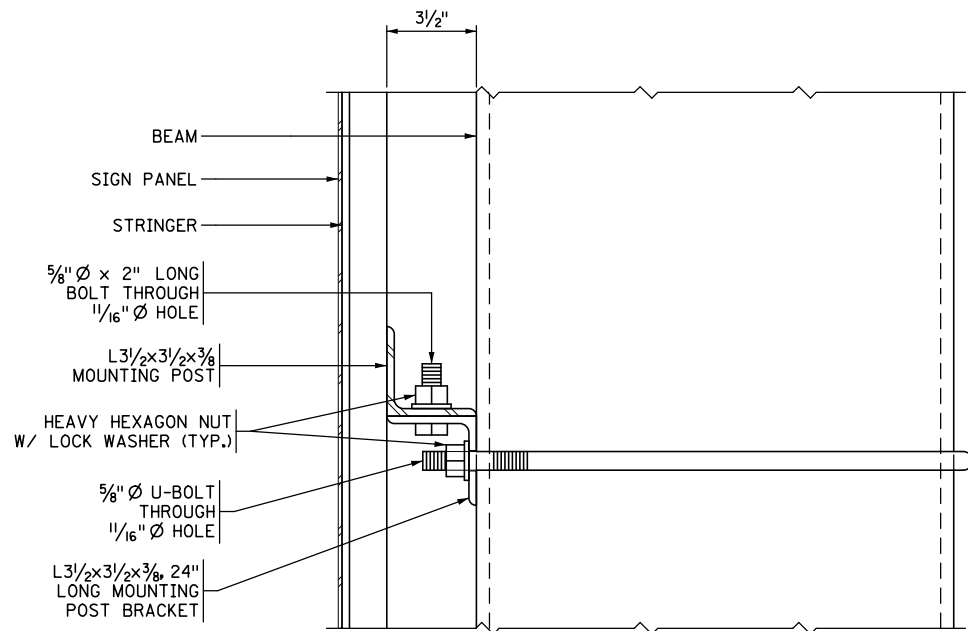


PLOTTED/REVISED: 6/22/2020

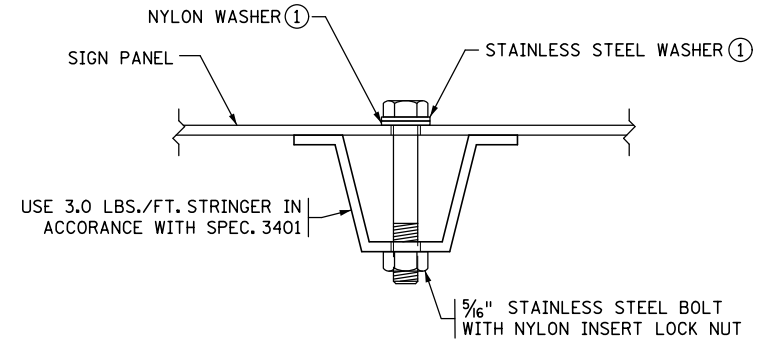
DISTRICT #: \$\$\$\$DISTRICT\$\$\$  
PLOT NAME: \$\$\$PLOT\$NAME\$\$\$  
PATH & FILENAME: \$\$\$PATH\$FILENAME\$\$\$



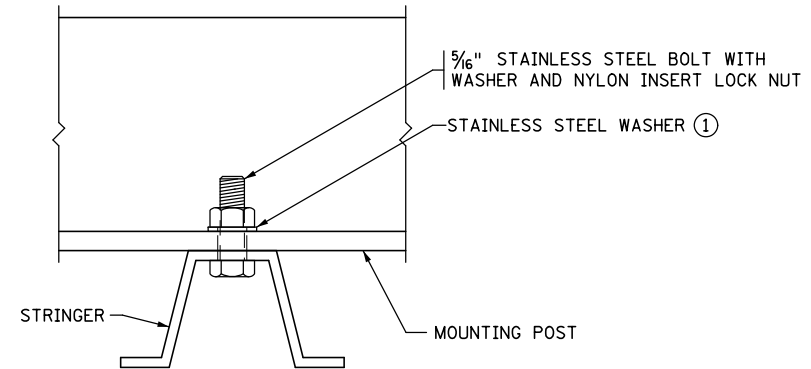
DETAIL D



SECTION A-A



SIGN PANEL TO STRINGER CONNECTION



STRINGER TO MOUNTING POST CONNECTION

NOTES:

- PROVIDE STAINLESS STEEL WASHERS AND NYLON WASHERS AS SHOWN. STAINLESS STEEL AND NYLON WASHERS SHALL HAVE IDENTICAL DIMENSIONS (T=1/32" MIN., I.D.=3/8" MAX., O.D.=7/8" MAX.).
- PROVIDE 5/8"Ø x 16" U-BOLT FOR HSS16x0.438 BEAM. PROVIDE 5/8"Ø x 20" U-BOLT FOR HSS20x0.5 BEAM. TIGHTEN U-BOLT NUTS TO 50 FT-LBS.

REVISION:
APPROVED: XXXXX XX, 2020
STATE BRIDGE ENGINEER

	STANDARD PLAN 5-297.749	2 OF 2	MONOTUBE OVERHEAD SIGN STRUCTURES SIGN PANEL AND EXIT PANEL DETAILS	
	APPROVED: 12-31-2099 REVISED:			
STATE DESIGN ENGINEER	STATE PROJ. NO.	(T.H. )	SHEET NO.	OF SHEETS